<u>REMARKS</u>

Claims 50, 69 and 80 have been amended to include a higher temperature range in excess of 45 °C for the bioleaching process. This range is simply a narrower temperature range of the disclosed broader temperature range in excess of 40°C.

Claims 50, 67-69, 71-73, 80 and 81 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Emmett, Jr. (US 5,007,620) in view of Applicant's admission of prior art and Eppstein (US 4,680,267) and Whellock (GB 2,225,256). First, Applicants assert that none of the prior art references relied upon by the Examiner disclose a bioleaching process including the step of "controlling the dissolved oxygen concentration in the slurry" in the manner provided by the claims. In the Background section of Applicants' specification, the Applicants indicate that when operating a bioleaching plant at a high temperature the rate of sulphide mineral leaching is limited due to the <u>solubility</u> of oxygen being limited. If air is used to supply oxygen, the leaching rate is then limited by the <u>oxygen transfer rate</u> from the gas to the liquid phase. The Applicants have merely stated a problem associated with previous bioleaching processes. The Background section does not teach or suggest a method for overcoming this limitation. More specifically, the Background section does not teach or suggest that controlling the dissolved oxygen concentration in the slurry is a known process for increasing the oxygen transfer. The Examiner has indicated that the Applicants have admitted "that the amount of oxygen in the slurry is the rate limiting variable of the bioleaching process". However, this is not what the Applicants included in the Background section. The Background mentions the limitation associated with <u>oxygen solubility</u> and <u>oxygen transfer</u>, which is not the same as "the amount of oxygen in the slurry". Applicants have unexpectedly discovered that oxygen solubility and

oxygen transfer are increased by controlling the dissolved oxygen concentration in the slurry. Additionally, the Examiner has indicated that the Emmett reference does not teach the step of controlling the dissolved oxygen concentration in the slurry. Likewise, the Whellock reference does not teach or suggest a method of controlling the dissolved oxygen content as provided in the claims. The Whellock reference uses high turbulence to enhance the oxygen uptake and bioleaching performance (see page 7, lines 24-26). The Eppstein reference is directed to a method for controlling the concentration of oxygen of a medium during a bioreaction process (see Abstract). However, the Eppstein reference is directed to controlling the concentration of oxygen in fermentors. One of ordinary skill in the art would not be motivated to combine the teachings of Eppstein related to a fermentor with the teachings of Emmett, Applicants' Background or Whellock related to bioleaching. The Examiner has indicated that there is a motivation to combine Eppstein and Emmett because Applicant's admission teaches that "dissolved oxygen controls the rate of reaction". However, as we have provided herein, Applicants have not admitted that the prior art teaches that dissolved oxygen controls the rate of reaction. Applicants have merely asserted the known limitations related to oxygen solubility and oxygen transfer in bioleaching processes. Therefore, the presently claimed invention is not obvious in view of the prior art. Second, Applicants have amended the claims to include the limitation that the temperature of the bioleaching process is in excess of 45 °C. The Emmett reference states that certain bacteria are extinguished or their activity severely limited at temperatures above approximately 46 °C (see column 21, lines 15-17). This statement merely provides information relating to a known problem associated with certain bacteria and the reason why a lower temperature is used during bioleaching. This reference does not teach or suggest operating the bioleaching process at this higher temperature. Although it may be argued that the

bacteria are capable of activity at a higher temperature, the Emmett reference clearly provides that the slurry containing the bacteria should be operated at a lower temperature. In fact, the Emmett reference specifically discloses a slurry temperature within the range of 30-36 °C (see column 11, lines 63-65). Finally, none of the prior art references cited by the Examiner provide a bioleaching process using pure oxygen in the feed gas so that the dissolved oxygen concentration in the slurry can be maintained at a desired level. The Examiner asserts that Whellock teaches a method of "feeding pure oxygen at low concentrations to improve oxygen take up rates thereby improving the overall reaction rate. However, the Whellock reference specifies that a downflow gas-transfer column and relatively high turbulence and bubble density provide the desired dissolved oxygen level (see page 6, lines 19-22). There is no teaching or suggestion in the Whellock reference that substantially pure oxygen in the feed gas is used to maintain a desired level of dissolved oxygen in the slurry. Applicants have unexpectedly discovered that high oxygen percentages in the feed gas permit the dissolved oxygen concentration in the slurry to be maintained at the desired level. When the dissolved oxygen concentration in the slurry is maintained at the desired level, as provided by Applicants' claimed invention, oxygen solubility and oxygen transfer are increased to provide an improved bioleaching reaction. Since none of the prior art reference disclose the use of substantially pure oxygen in the feed gas to provide a desired concentration of dissolved oxygen in the slurry, Applicants claimed invention would not be obvious to one of ordinary skill in the art. Because of the foregoing, Applicants assert that the prior art rejection is overcome and requests reconsideration and allowance of the claims.

Claims 51-65 are rejected stand rejected under 35 U.S.C 103(a) as being unpatentable over Emmet, Jr. (US 5,007,620) in view of Applicant's admission of prior art and Eppstein (US 4,680,267) as applied to claims 50, 67-69, 71-73, 80 and 81 above, and further in view of Steemson (WO 94/28184). For the reasons provided above, Applicants assert that the prior art rejection is overcome and requests reconsideration and allowance of the claims.

Claims 70 and 74-79 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Emmett, Jr. (US 5,007,620) in view of Applicant's admission of prior art and Eppstein (US 4,680,267) as applied to claims 50, 67-69, 71-73, 80 and 81 above, and further in view of Hutchins (U.S. 4,729, 788). For the reasons provided above, Applicants assert that the prior art rejection is overcome and requests reconsideration and allowance of the claims.

In view of the foregoing, Applicant respectfully submits that the art rejections are overcome and that the application is now in condition for allowance. Accordingly, favorable reconsideration and allowance of the application is respectfully requested.

Respectfully submitted,

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